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'From Now on We All Demand: Give Us Pure Ice!' – Natural and Artificial Ice in the Service of Food Hygiene in Nineteenth- and Twentieth-Century Helsinki, Finland

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ABSTRACT

This study examines how natural and manufactured ice were embraced in the expanding realm of urban hygiene in the Finnish capital city of Helsinki during the latter half of the nineteenth century and especially during the first half of the twentieth century. The study reveals the ambivalent nature of ice, as it was used as a mediator of coldness for refrigeration purposes. While it benefited hygienic food preservation, it was increasingly perceived as a potential transmitter of pathogenic bacteria, and thus a hygienic risk. The study addresses the ambiguous questions surrounding purity with regard to natural resources and their 'artificial' alternatives by linking them to the, then, increasingly topical problem of environmental pollution within the context of a rapidly urbanising and modernising city. The study contributes to the increasing number of environmental historical studies on the diverse aspects of the cryosphere by broadening the focus to urban regions.

KEYWORDS

Urban hygiene, food hygiene, ice, refrigeration, Finland, nineteenth and twentieth century

INTRODUCTION

Humans have used ice as a coolant for diverse purposes since ancient times. Utilising the natural process of freezing – i.e. the phase change of liquid water to solid – they created an effective storage of coldness in the ice. The use of ice for cooling has detached the creation of low temperatures from considerations of place and time. The bulkiness of ice enabled the transportation of coldness to distant places and the preservation of ice enabled temporal lags in generating coldness, irrespective of the season and the climatic conditions of a particular place.[1]

While the use of ice for cooling purposes is only one of several uses of freezing water – others might be smooth transportation routes and spaces of wintry leisure – ice as a cooling substance and traded commodity turned into a subject of politicised ideas and practices, and was of considerable economic interest. During the nineteenth century, ice became an affordable and widely available commodity, most prominently first in the US and some decades later in Europe, revolutionising the acquisition and preservation of foodstuffs. Ultimately, ice revolutionised the global food market as well. The harvesting and trading of ice became a flourishing industry, and cold chains dependent on ice ensured a steady demand for it.[2] The ice trade became an increasingly international endeavour, with coldness shipped in the form of ice blocks from northern latitudes to the sweltering south. The commercial harvesting of natural ice peaked during the nineteenth century in the US, most notably with the ice business of Fredric Tudor, known also as the 'Ice King'.[3] The European ice trade peaked during the last years of the nineteenth century. Norway became the world's leading country in terms of ice exports, with millions of tonnes of ice being shipped to cool especially Central Europe and Great Britain.[4] While the international scope of the ice trade and the technologies of ice-based refrigeration have received an increasing amount of scholarly and public attention, historiographical contributions on the local level dealings with ice remain scarce, as are the sanitary aspects of ice in an urban context.[5]

Investigating the evolution of local natural ice-based refrigeration highlights the importance of the linkages between sanitary ideas and the urban cryospheric environments. The heyday of ice-based refrigeration coincides with the emergence and establishment of the broad and embracing idea of *hygiene* as the basis for human health, especially during the latter half of the nineteenth century and the first half of the twentieth century. The hygienic movement materialised, for instance, in the new,

[1] Freidberg 2009; Rees 2014. Short summaries on the history of early ice usage are included in, e.g. David 1994; Lütgert 2000; Jackson 2015.

[2] Freidberg 2009; Rees 2014. William Cronon illustrates in his seminal *Nature's Metropolis* (1991) the significance of ice-refrigerated railway transportation for the geographical expansion of the meat industries in the continental United States.

[3] Seaburg and Paterson 2003; Weightman 2003; Blain 2006.

[4] Laakkonen 1997; David, 2000.

[5] See Gantz 2015; Rees 2014; Woods 2017. Jackson's study (2015) is an example of the growing popular historical literature on ice. Within the increasing number of studies on cryo-histories (Sörlin 2015), urban environments have thus far been marginal in comparison to, e.g. sparsely populated or polar regions.

modern mastery of urban water circulation through the creation of crucial infrastructures, most importantly water supply and wastewater treatment systems, which formed the centrepiece of the narrative about the urban sanitary revolution in an age marked by rapid urbanisation, industrialisation and population growth.[6] However, research on the new functions of and controls on urban water as part of the urban hygienic project of the late nineteenth century has so far mostly neglected the importance of solid water, even though an important link between the hygienic movement and ice as a natural resource emerged at the time. The local level scrutiny applied in this study reveals how the hygienic project and its cryopolitical dimension was in terms of food hygiene neither straightforward nor unambiguous. International influences fused with local environmental conditions and particular urban developments sketch a more nuanced picture of both the hygienic project and the role of urban ice in it.

This article explores the role of natural and manufactured ice and its use within the context of the hygienic era of the nineteenth and early twentieth centuries. The geographic focus of the study is the city of Helsinki, Finland, which grew during the latter half of the nineteenth century into a modern 'metropolis of modest proportions'.[7] Located in the European periphery and, apart from its few cities, still a firmly agrarian country with long distances to main ice importing countries, Finland was never a part of the international ice trade and thus relatively long unaffected by the international trends of globalising refrigeration.[8] In comparison to other western capital- or other larger cities, Helsinki was a latecomer in large-scale ice-based refrigeration, and it was also for a much longer time unregulated, and not commercialised. Additionally, the period of cooling relying on natural ice lasted much longer.[9] However, peripheral Finland was not isolated in terms of the diffusion of ideas, technologies and practices. The investigation of the case of Helsinki shows that the need and aspiration for mastering cooling in an urban setting was in many ways similar across the western world. However, the magnitude, mode, and timing seem to be different in Helsinki.[10] In an environment characterised by the abundance of waters and a climate allowing regular and firm freezing of those waters, the typical and rather linear storyline of the history of ice-based refrigeration – with an increasing demand, insufficient and unreliable availability and the victorious march of technological solutions to solve the problem – does not apply. Concentrating the study on one physically rather remote, urban location with no climatically pressing reasons for efficient cooling casts light on other reasons for the competition of artificial ice with natural ice, and eventually mechanical refrigeration. The study traces back the hygienic dimensions of urban ice and

[6] The sanitary revolution, as it is often labelled, has been well studied; see, e.g. Hamlin 1991; Melosi 2000. In the Finnish context, see Laakkonen 2001; Juuti 2015.

[7] Bell and Hietala 2002, 134.

[8] Thus far, the only evidence of ice being harvested in Finland for exports is from March 1898, when newspapers reported that 80 men and 50 horses were busy on Lake Tuusula some 30 km north of Helsinki to harvest an expected 60,000 blocks of ice that would be shipped to Germany the following summer. The company, a Norwegian trading house, was forced to come to southern Finland for ice harvesting due to insufficient ice supply in Norway that year (*Karjalatar* 24 Mar. 1898, 3.)

[9] Lepistö 1994.

[10] Because the history of urban ice has been somewhat poorly investigated, more detailed comparisons will be possible only after some more research is available.

highlights the importance of ice in the urban context, as well as the emerging hygienic threats related to ice as one of the consequences of the sanitary revolution. Thus, the investigation of a northern location nuances the historical picture of cooling as an urban necessity.

In nineteenth century Helsinki, urban growth spurred the demand for ice in new forms of food production, processing and storage. Beer brewing required low temperatures during the production process, which meant breweries were dependent on cooling year round, making them, at first, the main users of ice. Newly flourishing leisure-time activities, such as visiting parks and restaurants, created new demands for cool drinks and iced delicacies.[11]

Due to Helsinki's northerly geographic and climatic characteristics, natural ice was directly and abundantly available, and it originated from two distinct sources. Brackish seawater with a very low level of salinity made it possible to harvest urban sea ice all around the central peninsula. The main source of fresh water-based ice was the Vantaa River (*Vantaanjoki)*, a modest-sized river, whose mouth is in a shallow bay eight kilometres northeast of downtown Helsinki. The Vantaa River forks at its mouth into two branches, with rapids of six metres altitude difference.[12] These rapids and the absence of tides effectively prevent the mixing of seawater with river water. Hence, it was possible to harvest river ice just on the other side of the rapids (see Figure 1).

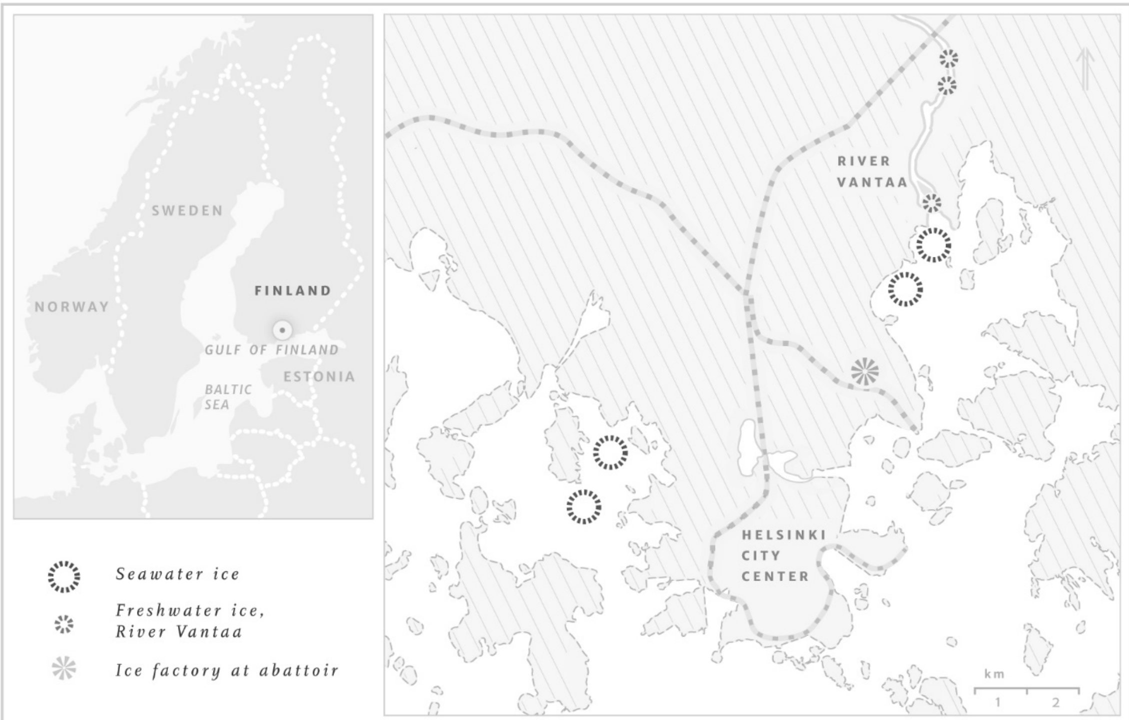

Figure 1. Main ice harvesting areas in Helsinki during the late nineteenth century and first half of the twentieth century, and the city abattoir's ice factory. The ice harvesting locations are derived from the ice harvesting permissions granted by the city authorities. Map by the author.

[11] Åström 1956, 230.

[12] The western rapid has been dammed for centuries, while the eastern branch continues to flow freely.

Due to its northern location (60° north), with a cool climate and cold winters, the demand for ice-based refrigeration was rather marginal in Helsinki for a long time in comparison to more southern cities. At the same time, the presence and usage of ice was so self-evident and pervasive that it was rather poorly and inconsistently recorded. For a long time, the acquisition of ice was carried out self-sufficiently and without organisation by individual operators, e.g. breweries.[13] The first few documentary accounts of the ice trade in Helsinki refer to the 1830s, but more informative contemporary accounts of the ice trade and ice harvesting regulations by the city of Helsinki start from around the 1880s.[14]

This study contributes to existing urban environmental history scholarship by broadening the widely studied field of urban sanitary history to include solid water, as the hygienic issues pertaining to ice have not thus far been accounted for with respect to the hygienic problems of urban environments.[15] While the existing literature on the history of refrigeration mentions in passing the water pollution problem in conjunction with the development of the ice industry,[16] a more thorough and versatile discussion of the hygienic aspects of urban ice is lacking in the literature. At the same time, the article contributes to our current understanding of food hygiene as part of the hygienic project of the nineteenth and early twentieth centuries. The article proceeds with a contextualisation of the hygienic movement and links it to the control of low temperatures. In the following sections, the ambivalent role of ice as a hygienic asset and a hygiene threat is elaborated upon and the increase in the popularity of artificial ice as a hygienically superior alternative is discussed. The article concludes by highlighting the ambiguous nature of ice in the service of sanitary ideals.

URBAN HYGIENE

While contemporary understandings of hygiene mostly pertain to the personal cleanliness of individuals, during the era of its powerful influence in the nineteenth and early twentieth centuries, hygiene referred more broadly to preventative health care measures.[17] The medical-administrative project of hygiene aimed in general at enhancing the conditions necessary to maintain and strengthen people's health, eradicate unhealthy conditions and, thus, prevent illness. The hygienic ideals were based on the demographic and economic objectives of ensuring a healthy population

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[13] For instance, the official records never mention the Helsinki-based Robsahm brewery as an ice harvester, but a newspaper announcement noted that at the time of its bankruptcy and subsequent auction, equipment for ice harvesting was also sold (*Uusi Suometar,* 9 Apr. 1895, 4).

[14] Helsinki City Archive (hereinafter HCA)/Health Board (hereinafter HB) 1935/Minutes/Ca:58/14 Feb. 1935/32 §, Appendices 1 and 2. To the best of the author's knowledge, the existing literature on the utilisation of and trade in ice in Finland is nearly non-existent, though some popular publications anecdotally mention some aspects of the ice business; see Kosonen and Rekola 1984; Nääppä 1997.

[15] Finnish urban environmental historical scholarship has almost entirely neglected the cryospheric dimension. Laakkonen (1997) is an exception, but this comparative study concentrates on the role of sea ice in isolating the city from the outside world in the age before modern ice breaking.

[16] Rees 2014, esp. ch. 3; Freidberg 2009.

[17] Hård and Jamison 2005, 227.

and work force.[18] In working towards these objectives, the prevention of contagious diseases as well as the degeneration of the population through mental or physical defects was a primary goal. The scope of the hygienic movement and the reforms that derived from it impacted on several aspects of both public and private life. The cleanliness of public spaces, such as streets, schools and working places; improved sanitation; and a safe water supply infrastructure were central aims of public hygiene initiatives. The cleanliness and airiness of homes and personal hygiene, on the other hand, were matters of private hygiene. Besides physical living conditions, moral aspects of mental hygiene and societal 'fitness' were also important to the wholesome hygienic movement.[19]

Despite the abundance of studies on the different dimensions of sanitary and hygienic reforms, food hygiene in general has received much less scholarly attention, and its position within the hygienic project is contested. While some scholars have situated food hygiene within both the private and public spheres of hygiene, particularly in relation to the multiphase processes of production, storage, transportation, distribution, preparation and eventually the consumption of foodstuffs, it seems appropriate to postulate that food hygiene occupied a middle ground between the public and private spheres.[20]

Two important and interrelated developments in the nineteenth century were crucial for advances in hygiene: urbanisation and the science of bacteriology. The unprecedented pace of urbanisation in the Western world in the nineteenth century created infamous new, urban spaces of physical and social disorder, a mixture and proximity of people, animals, waste, dirt, poverty and disease. The occurrence of deadly epidemics, particularly cholera and typhoid fever, was pronounced in urban settings. The dense coexistence of so many people, brought together by new modes of working and living as well as new means of acquiring victuals, created and intensified the adverse effects of new, urbanised living environments.[21]

Scientific knowledge about bacteria and contagious diseases revolutionised the principles, that defined healthy urban conditions and environments. Revelations emerging from the advancing scientific fields of microbiology and bacteriology, most prominently through the work of the Frenchman Louis Pasteur and the German Robert Koch, allowed hygienists to now identify pathogenic bacteria, previously an invisible 'enemy', and focus their efforts on the battle against them.[22] New theories on germs and new ideas about (environmental) hygiene as a cornerstone of public health soon became widely accepted. Thus, the relationship between human health and elements of the natural world was now central in the evolution of hygienic thinking and principles.

[18] Hierholzer 2010, 36.

[19] Hietala 1992; Lehtonen 1995; The Finnish currents of the hygienic movement have been elaborated on by Harjula 2007; Hård and Jamison 2005, ch. 9. The literature on the various themes relating to the history of hygiene is abundant. The cultural concepts of dirt, cleanliness and purity are central to the hygienic literature; for influential contributions, see, e.g. Douglas 1966; a collection of essays edited by Cohen and Johnson 2005; Hamlin 2011. The cultural construction of dirt has been challenged by Curtis 2007. See also Vigarello (1988) for a discussion of France; Smith (2007) for the British context. In contrast to the aforementioned works, which predominantly focus on the cultural dimensions of sanitary and hygienic reforms, Tomes (1998) approaches the matter from a practical domestic standpoint.

[20] Hård and Jamison 2005, 228–229, and Harjula 2007, respectively.

[21] Harjula 2003, 61.

[22] Latour 1993.

Clean water, fresh and pure air, and sunlight represented the starting point for new hygienic objectives, while authorities increasingly declared that standing water, moisture, darkness and damp air posed threats to human health.[23] The hygienic movement became the dominant ethos within the increasingly authoritative medical profession, and public health experts became more widely involved in sanitary efforts, including expressing concerns over urban water and air pollution, waste management and food safety.[24]

The hygienic project was very international, and ideas presented in central Europe spread quickly to the geographic margins and cities like Helsinki.[25] The lines of hygienic thinking and reform in Finland followed closely the paths pursued in other European societies. For instance, the first Finnish professor of hygiene, Wilhelm J. Sucksdorff (1851–1934, professor from1890), like many professionals at the time, received his training in central Europe, in the city of Leipzig, where he investigated the bacteriological composition of tap water. In 1895, Sucksdorff switched to more practically-oriented work and began serving as the principal city doctor of Helsinki.[26] Hence, the foundations for the administrative aspects of new urban hygiene measures in Helsinki were laid during the latter part of the nineteenth century. Following the first Health Act of 1879, several decrees regulating hygienic conditions in the city were enacted and control mechanisms were established. While they do not refer explicitly to ice and its usage in the city, they nonetheless greatly influenced the history of ice usage in Helsinki, as will be shown in subsequent sections.

ICE IN SERVICE OF THE HYGIENIC PROJECT

Apart from the direct medical use of ice, mainly for the cooling relief of feverish patients, and the use of ice as part of 'cold hygiene', consisting of invigorating and hardening cold baths,[27] the health-related uses of ice concentrated on a rapidly emerging branch of the hygienic movement, food hygiene.[28] In the wake of creating an administrative and regulatory apparatus for enhancing urban hygienic conditions in Helsinki, the newly established City Health Board established a food inspection laboratory in 1884, and decrees about the correct preservation of victuals were issued in 1889 and 1890.

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[23] Harjula 2003, 61. The concept of purity has been studied especially in regard to water, and scholars have convincingly argued that 'pure water' is a relative concept, one that is socially, politically and culturally constructed and that specific ideas about water purity were contested and deliberately shaped (Melosi 2000; Goubert 1988; Roberts 2006).

[24] See, e.g. Melosi 2000. For Finland, see Nygård 2004.

[25] Hietala 1987. E. g. Svarverud (2018) shows with a case from China, how the predominantly western ideals of hygiene as the backbone of healthy, modern life became a global phenomenon and diffused also to other continents.

[26] Hirvonen 1990. For the internationalisation of Finnish professionals, see Hietala 1992.

[27] Sources on the medical use of ice in the Finnish context are scarce. The necessity of using ice as a cure was considered obvious in the Finnish medical journal *Duodecim*, but the journal did not elaborate on its uses in more detail. Apart from fever relief, it seems reasonable to think that ice was also used as an anaesthetic. 'Cold hygiene' is discussed by Smith (2009).

[28] Harjula 2007. Historical research on food quality and its regulation during the hygienic era has focused on food adulteration and forgery. See Hierholzer (2010) for a legal and economic historical approach to food quality regulation in the German Kaiserreich and Hardy (1999) for the early history of food hygiene in Britain.

The hygienic role of ice in refrigeration materialised most importantly in the trade of dairy products. Milk was a particular point of focus for the hygienic movement because of its vulnerability to deterioration and contamination on the one hand, and child mortality on the other. Helsinki prohibited the keeping of animals in the central parts of the city in the 1870s, meaning that more milk was subsequently transported from the countryside to the urban market. This underscored the necessity of a cold chain that began in the barns and dairies and extended to the urban consumer.[29]

Milk inspection first started in Helsinki around the turn of the century. Such inspections initially concentrated on the fat concentration, but in 1917 a new test was introduced to inspect the durability of milk, which depended on the proper refrigeration of milk during the entire path from production to consumption, with transportation and storage being crucial factors.[30] The qualitative problems of milk durability were most pronounced during the summer months, when refrigeration needs were greatest. Health officials attributed the flaws in quality to the inadequate preservation of milk and to insufficient use of ice.[31] While the average annual amount of inferior milk resulting from poor durability accounted for approximately ten per cent of the inspected samples, during July the percentage increased to 82 per cent, as in the hot summer of 1930. The previous mild winter had hampered ice harvests and milk retailers did not use enough ice for the proper refrigeration of milk.[32] The city had ordered in 1898 that milk could only be sold in designated milk shops, which were typically small (Figure 2). Milk shops relied on ice for refrigeration a much longer time than other retailers. This situation was not quick to change. For instance, sixty per cent of the nearly 800 milk shops in town still relied on ice for refrigeration in 1955.[33]

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[29] Hentilä 1999, 112–21.

[30] Enkvist 1974; Perko 2011. The Finnish veterinarian Walter Ehrström, who studied in Germany and had worked for the city of Helsinki since 1918, has been proclaimed 'the father of Finnish milk hygiene' (Perko 2011, 12). He has been internationally recognised for his achievements in the field and for developing the reduction test for the durability of milk.

[31] v. Hellens 1899; Statistics of the City of Helsinki I (hereinafter SCH I) 1920/11:1, p. 80.

[32] SCH I 1930/21:1, p. 110–112.

[33] SCH I 1955/40:1, 53–54. As a point of comparison, out of 450 meat shops, only 7 were without electric refrigeration in 1955.

Figure 2. Milk and bread shop in Helsinki, early 1930s. The milk containers are stored in ice-cooled water. Source: Ramsay 1932, 66, courtesy of the Ingman Group Oy Ab.

The increased understanding of the ability of cold temperatures to eliminate or at least considerably reduce the growth of bacteria made the preservation of foods through refrigeration the backbone of food hygiene. While the concern of food hygienists was to ensure the sufficient availability and use of ice for proper refrigeration, this proved increasingly challenging during the first half of the twentieth century due to other hygienic concerns.

CONTESTED PURITY OF ICE

The key question about the hygienic threat of ice concerned the virulence of pathogens throughout the freezing process. While advances in bacteriology showed that water was a common distributor of pathogens, and thus formed the cornerstone for sanitary reforms in regard to urban waters, the common and scientific understandings of the physical and chemical conditions of ice had been contradictory and ambiguous for a long time.

Many authorities had long concluded that freezing serves as a self-purifying process, thus producing hygienically flawless, pure ice. Yet, theories about the purifying mechanism of freezing still varied. It was believed that the germs trapped in ice either froze or starved to death, or that impurities were expelled when ice crystallised.[34] Thus, accounts referred to the indisputable naturalness of the process, declaring that ‘it is the Law of Nature that even the dirtiest water is purified through freezing’.[35] Decades later, when the food laboratory in Helsinki expanded its hygienic investigations with more refined and advanced laboratory methods to include ice samples as well,

[34] Prudden 1891; see also Rees 2014, 55.

[35] *Tampereen Sanomat,* 13 Oct. 1885, 3. Original wording: ‘On Luonnon laki että likaisinkin vesi puhdistuu jäätyessään’.

their experts were convinced of the universal purity of ice, regardless of its origin. They concluded that 'research has shown, as many times before, that dirty and infected water can deliver hygienically satisfactory ice'.[36]

On the other hand, as part of the advances in bacteriology, scientific evidence about the persistent virulence of pathogens, despite freezing, was becoming more widely known. The first outbreak of disease that was directly linked to impure ice had been reported from a summer resort at Rye Beach, in the US, in 1875; since then, several cases of epidemics traceable to impure ice had been reported in the US and central Europe.[37] Likewise, research done on bacteriological consistency and their virulence in raw ice revoked the past assumptions about freezing killing bacteria in water effectively.

Bacteria had been found in snow and ice, and scientists disclosed that different types of bacteria have different resistance towards coldness and freezing. This unexpected resilience of bacteria to freezing promoted new research on ice, for example in Germany, and new evidence demonstrated that freezing did not purify water of pathogens.[38] Hence, around the turn of the century it was popularly disseminated that impurities in ice could be a reason for illness.[39] However, entirely contradictory views on the issue were also being proclaimed, and conclusions about the health risks related to ice originating from polluted water were being refuted by influential authorities. Charles V. Chapin (1856–1941), the pioneer of public health research in the US and soon-to-be president of the American Public Health Association, deemed the dangers posed by ice harvested from polluted ponds to be exaggerated and pointed out that reports on cases about contagion stemming from ice were not conclusive.[40] The lack of consensus about, and even contradictory understandings of, the purity of ice as such, and the implications of the phase change from liquid water to solid ice through freezing, left the contemporaries with a variety of possible interpretations of and reactive solutions to the issue.

NATURAL ICE AS A HYGIENIC RISK

Thanks to the international orientation of Finnish medical experts, especially in the field of hygiene around the turn of the century,[41] the Finnish professionals were well informed about developments in continental Europe, especially in Germany, as well as in the US. Publications from Germany, France and the US reported on ice-related health issues, and both Finnish professional journals and newspapers reported the news from abroad.

[36] SCH I 1954/38:1, 27–28.

[37] Prudden 1891; Sedgwick and Winslow 1902.

[38] Heyroth 1888; Manner 1891a and 1891b.

[39] Prudden 1891; Richardson 1904. This seminal 'Medicology or Home Encyclopedia of Health: a complete Family Guide' was a popular, ten-volume guidebook series.

[40] Chapin 1912.

[41] Hietala 1992.

Already in 1890, Finnish medical experts warned that ice from polluted waters might contain vital pathogens, which was particularly dangerous when ice was used as a medical relief.[42] A large-scale cholera epidemic in the summer of 1892 focused attention once again on the potential hygienic risks posed by ice. Finnish papers reported on how ice harvested from a number of central European rivers – the Spree, Weichsel, Elbe, Oder and Seine – had recently been declared polluted. Nonetheless, workers had continued to harvest ice from the rivers, forcing authorities to step in and ban the use of natural ice due to health risks in several cities. Ice had been confiscated and the public warned about using polluted ice. This sparked heated debates about the purity of natural ice. Ice dealers claimed that only a small portion of the ice harvested from questionable sources came in direct contact with foodstuffs, with most of it being used only for purposes of refrigeration. However, scientists rejected this functional separation of the uses of ice, making a counterargument that all ice is of equal quality and that it is impossible to distinguish between polluted and pure ice. Furthermore, even if ice was used only for refrigeration without it coming into direct contact with foodstuffs, the ice was still being handled by people, who were in constant danger of coming into contact with a contagion.[43]

While the hygienic threat caused by ice never seems to have become a subject of heated debate in Finland, awareness of the potential risks was evident. Already in 1891, the doctor Viktor Manner supported the conclusions of his German colleagues that ordinary raw ice should not be used in connection with food and drink, nor for treating wounds. For those purposes, artificial ice made out of distilled water would be preferable.[44] A typhoid epidemic that raged in Finland during the years 1907–1909 led to several new orders regarding the safer handling of water. In Tampere and Helsinki, special caution was also advised in the handling of ice.[45] However, more detailed explanations on what this caution could be in practice were not given. While authorities felt it important to educate the general public on hygienic principles[46] in conjunction with the use of ice and the threats related to it, the implementation of the idea was wanting and no real efforts were made to provide people with the appropriate information.

Concerns about the hygienic demands of ice were largely directed at the harvesters of ice. Farmers were reminded that ice should only be harvested from pure waters and not just ‘any puddle’,[47] and that the storage room for ice must be protected from contact with impure substances.[48] In Helsinki, the source of ice became even more crucial with advances in urban sanitation, as the surrounding coastal waters had become seriously polluted by the turn of the century. The first water closets were built in the city in the 1880s, and after gaining official approval in 1895, a water-based sewage

[42] ‘Jäätä sairaita varten ottaessa’ (1890) *Suomen Terveydenhoitolehti* 2 (4): 63.

[43] ‘Jään ottaminen taudin tartuttamasta wedestä’ (1893) *Suomen Terveydenhoitolehti* 5 (4): 78–80; *Uusi Suometar,* 7 Apr. 1893, 4. The news also reported on the reluctance of powerful brewers in the Free State of Hamburg to abide by the ban on natural ice harvesting, indicating the strong economic interests involved in the ice trade there.

[44] Manner 1891b, 87.

[45] Harjula 2003, 116.

[46] Harjula 2007.

[47] Jääsaha (pseudonym) 1931.

[48] Kautola 1935.

disposal system became increasingly common, especially in new buildings. Unpurified wastewater drained directly into the surrounding waters, causing severe hygienic problems. The construction of the first wastewater purification plant in 1910 was an attempt to tackle the problem, but the plant's purification capacity never kept pace with the expanding water supply and sewage infrastructure, nor with the increasing amount of sewage polluting the shoreline.[49]

The emerging ice trade regulations, which had previously mainly been concerned with ensuring the safety of passersby close to the harvesting areas and limiting the potential damage caused to water supply equipment, were being re-evaluated from a hygienic standpoint as well. The first bacterial investigations of ice in Helsinki were coordinated by the harvesters themselves. The Hartwall company, which harvested ice and delivered it in conjunction with its soda drinks, conducted bacterial investigations of the ice from the Vantaa River in 1919–1920. They highlighted the excellent hygienic quality of the ice from the river because their tests revealed a very low bacteria content in the core ice, ranging from between zero and four bacteria per cubic centimetre, and with an average of 0.92 bacteria per cubic centimetre. The quality of the river ice was contrasted with the ice harvested from the brackish Baltic Sea water along the polluted shores of the city. In addition to its qualitative purity, river ice was considered superior; river ice was 'clear and beautiful', while sea ice was porous and loose.[50] In addition, dairies in particular avoided sea ice, as it was assumed that salinity would damage the milk containers.[51] More heated debates about the hygienic purity of ice began in Helsinki more than a decade later, though.

During the 1930s, the ice trade in Helsinki became more complicated. More detailed investigations of the hygienic properties of ice led to a qualitative differentiation of ice types and a functional differentiation of ice uses. While the city's Board for Property continued to sell licenses for ice harvests, health officials began to restrict the sale and use of ice due to associated health risks. In 1934, for instance, incidents of infantile paralysis (polio) and paratyphus alarmed health officials. The water of the Vantaa River was suspected of having been one possible transmitter. Hence, officials attempted to obtain a better understanding of the particularities of the hygienic problem related to the harvesting of ice. The health officials in fact did not accuse the ice itself of impurity, but claimed that the ice may have come into contact with impure water. This could happen if thawing had set in and surface waters from the land had flowed out onto the ice or if infected or polluted river water from underneath the ice had affected it.[52] The ambiguity about the purity of ice itself remained.

Increasing doubts about the hygienic quality of natural ice led to increased attention by the authorities in the mid-1930s to how best to inspect ice. The scope of the hygienic inspections broadened to include samples from the end-users of ice as well, especially restaurants. Likewise, samples from the ice dealers' warehouses were examined. Besides the visual appearance of the ice, the amount and type of silted material in the ice was examined, and the amount of bacteria in the ice

[49] Laakkonen 2001.

[50] 'Stadens is-åker', *Helsingfors journalen* 7/1933, 158, 168.

[51] HCA/Chamber of Finances (hereinafter CF) 1919/Minutes Ca:112/19 Dec. 1919, 54§, Appendix 1 (Microcard 2294); HCA/HB 1935/Minutes/Ca:58/17 Jan. 1935, 35§ Appendices 3, 5 and 6.

[52] HCA/HB/Letter Concepts 1935/ Da:41/ Letter number 291.

as well as the amount of ammonia and chlorine were determined. Additionally, the level of consumption of potassium manganate was determined; this figure was used to indicate the amount of organic residues in the ice.[53] Though the studies showed that the ice was in general of good quality and that no actual instance of disease could be attributed to the ice sold and used in the city, a new, stricter precautionary principle was nonetheless applied.

The following winter, the sale of ice from the Vantaa River was forbidden if it was likely that the ice would come into direct contact with foodstuffs.[54] Exemptions were granted only for customers that testified that the ice would only be used for external cooling purposes.[55] In practice, this meant that milk containers could be cooled with river ice, but that butter, which was stored on ice blocks wrapped only in paper, could not be cooled with the same ice. One year later, authorities declared river ice pure and instead banned sea ice because of new evidence of pollution via sewage.[56] The increasingly detailed regulations and short-notice restrictions on ice use harmed the predictability and reliability of the ice trade and the use of ice. The brewery industry in particular was frustrated with the situation. How could brewers hope to ensure that restaurants would serve their products appropriately cooled if they were denied access to ice?[57]

Following this confusing regulative state with respect to ice trade, the Health Board in 1935 passed new principles that were applied to ice harvesting and the issuing of trade licenses:

> Surface water shall not enter the surface of ice; only bright steel ice may be sold; ice must be taken from relatively deep out and not too near the shore; the harvester needs to inform the Health Board of the exact location and date of the anticipated harvesting to enable surveillance; ice from different locations must be stored separately so that confusion about different kinds of ice is impossible; the applicant must bear the travel costs of the inspector; the retailer of ice must remind the buyers that the ice shall not come into contact with foodstuffs and that it is not to be mixed with drinks; and the orders of the health officials are to be closely followed.[58]

The following year the Health Board added that the murky parts must be removed from the ice blocks before delivering to stock and that only clean and fresh sawdust may be used to cover the ice for preservation.[59] The increasingly voiced doubts about the hygienic quality of natural ice and the timing of the restrictions placed on the trade and use of natural ice were connected with the emergence of a new, commercially available source of ice – manufactured 'artificial' ice.

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[53] HCA/Hygienic laboratory/Serial inspections DcI:24 Drinking water and ice/20:1, Letter to the Health Board, dated 22 Aug. 1935.

[54] HCA/HB/Letter Concepts 1935/ Da:41/ Letter number 291.

[55] HCA/HB/HBM/Ca:58/Jan. 3, 1935, 20§ and Jan. 17, 35§, Appendices 1–18.

[56] HCA/HB/HBM/Ca:59/19 Dec. 1935, 33§, Appendix 1.

[57] 'Oluen käsittely anniskeluravintoloissa', *Mallasjuomat* 3/1936, 77.

[58] HCA/SCH I 1935/20:1, p. 8. Steel ice refers to the inner segments of an ice block (in Finnish *teräsjää,* or *ydinjää,* occasionally also called *pohjajää*. Some of the documents are in Swedish, where it is called *kärnis).* Translation by the author.

[59] HCA/SCH I 1936/21:1, p. 9.

NATURAL VERSUS MANUFACTURED 'ARTIFICIAL' ICE

By the mid-nineteenth century, shortages of natural ice, so-called ice famines, triggered inventors to search for alternative solutions to ensure the availability of the coolant. The Florida-based physician John Gorrie and the Frenchman Ferdinand Carré patented new ice-making machinery in 1851 and 1859, respectively, with both having been proclaimed the pioneers of artificially produced, factory-made ice. The German Carl von Linde became the most successful manufacturer of refrigeration equipment, all of which could effectively be used for the manufacturing of ice. The technological developments and redesign of the machinery continued for decades, but the principle of detaching ice production from particular seasons and from locations cold enough for freezing was revolutionary.[60] Mechanical refrigeration technology was introduced in Helsinki for the first time in 1892, when the first machinery was installed in the Sinebrychoff brewery.[61] However, machine produced ice long remained a rarity and used only in the businesses' own operations, and it often only added to the traditional natural ice based cooling, instead of replacing it altogether. For instance, the Sinebrychoff brewery still delivered natural ice to their customers in conjunction with their beverages. Natural ice harvesters were until the 1930s the sole, main provider of ice for retail purposes. This changed only in the 1930s, when the natural ice business started facing competition from artificially manufactured ice.

The introduction of artificial ice in Helsinki can be seen as one component in the broad and winding continuum of urban modernisation that started during the latter part of the nineteenth century, and in the 1930s extended also to the realm of industrialised and 'modern' ways of producing coldness. To understand why this shift happened only during the 1930s, one must see the manifold aspects that eventually contributed to the introduction of commercialised, artificial ice in Helsinki.

With the trends of steady urban population growth and a densifying city, changes in the urban food supply system revolutionised the ways food and drinks were produced, transported, stored and sold. Along with the enforcement of the increasing knowledge about food hygiene in practical regulation e.g. with dairies, new retailing structures added to the need for improved food preservation. As a whole, food provisioning developed into an increasingly complex system intertwined with and reliant on various service networks of transportation and retailing, and related technologies and infrastructures. At the same time, branches where efficient refrigeration was particularly important, namely the dairy and meat processing industries, grew into a significant sector among Helsinki's food industries.[62] While these tendencies can be discerned decades earlier, at the beginnin of the century, the magnitude of the need was not then so pressing as to justify the heavy investments in technology that abandoning the traditional way of small businesses operating with natural ice-based

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[60] Freidberg 2009, 24. For a comprehensive review of the different ice-making technologies developed during the latter half of the nineteenth century, see Reif-Acherman 2012. Hård (1994) provides an analysis of the scientification of refrigeration technology. See also Heintze 2014.

[61] 'Om artificiell afkylning I bryggerier (1892) *Teknikern* **35**: 109–10. They used mechanical refrigeration for the brewing process and cold storage, but it did not replace the use of ice entirely. The company continued to harvest ice close to its premises until 1930 (HCA/CF/ 1930/Subcommittee/Cc:11/Minutes, 12 Feb. 1930, 3485§).

[62] Hoffman 1997, 307–21.

cooling would have required. The initiative for a shift towards commercial magnitudes of machine-produced cold was to come from an economically big enough operator, i.e. the city itself. The city owned an abattoir, which emphasised high hygienic standards and was a great consumer of coldness itself, so it was a natural operational entity in which to install an ice factory; viewed from within the prospects of ever increasing demand for ice, this was also seen as a profitable endeavour.

However, the construction effort of a new communal abattoir was an exceptionally lengthy process, influenced by global turmoil and its national currents, so that the abattoir ice factory started operation only during the 1930s. The project of constructing a new abattoir was initiated for the first time in 1913, but interrupted because of World War I and consequent financial difficulties in 1916. The gruesome and devastating Finnish civil war (1918), following independence the previous year, halted all non-vital projects until economic recovery commenced. In 1923 Helsinki reinstated the past decision of building a new communal abattoir.[63] The newly made plans reflected the planners' suppositions of the new needs of a modern city, and included the city's first ice factory. The planning and construction of the abattoir was an emphatically modern project, one aimed at making hygienic improvements to the city. A modern metropolis needed modern ways of securing the functioning of the manifold needs of an urban lifestyle. Planners drew inspiration for the newest abattoir design from the experiences of other Nordic countries and especially Germany, where artificial ice from factories was common and had replaced natural ice much earlier.[64] The construction of an ice factory based on examples and design principles derived from central Europe was strongly promoted by the leaders of the construction committee in order to convince the hesitant city council of its necessity.[65] The ice factory started operation in 1933. The factory was able to produce up to ten tonnes of 'good, hygienic ice' daily, as stated in the request for the health board's authorisation of the sale of ice.[66] After establishing an efficient retailing and delivery system and offering discounts to regular customers, the artificial ice business gained momentum. While sales fluctuated and were highly unpredictable, the demand for artificial ice exceeded initial expectations (see Figure 3). In 1934, eight times more ice was sold than the up-front estimates.[67]

[63] See Wager (2009) for more on the construction history of the abattoir.

[64] During the planning process, two extensive study journeys were made to other Nordic countries and Germany to investigate the design of existing, modern abattoirs (HCA/Abattoir construction committee K142/Minutes of meetings 1929, Ca: 7, 18 Apr. 1929, 1§ and HCA/Abattoir construction committee/Letters 1929–1931/ Loose document *Berättelse angiven av undertecknade över en år 1929 till utländska slaktinrättningar företagen studieresa. Av Hannes Tallqvist & Bertel Liljequist* [Translation of the title: *Report of the signatories about the study journey made in 1929 to foreign abattoirs. Hannes Tallqvist & Bertel Liljequist*]. The journey was undertaken by the manager of the abattoir (Tallqvist) and the leading architect chosen for the planning phase (Liljequist). See Lütgert (2000) for more on German ice acquisition, and Heintze (2014), 10, for more on refrigeration conditions for late nineteenth century abattoirs in Berlin.

[65] Wager 2009, 161.

[66] HCA/Board of the Abattoir (BoA)/Letter duplicates 1932–1940, Df: 1–9/Bundle 1934/Letter to the Health Board 20 Jan. 1934, Letter Nr 15.

[67] HCA/ BoA 1932–1933/Minutes 20 Dec. 1932, 3§/ C Cl:1/ Unnumbered Appendix; HCA/Annual report of municipal administration 1934/ Annual report of the abattoir. See also Wager 2009, 165–166.

Food industries in the region especially turned to artificial ice, and the single most important customer segment was the city's sausage factories.[68]

Figure 3. Estimations of artificial ice produced by the abattoir, 1933–1970. Source: due to statistical inconsistencies, data were compiled variably using the abattoir annual reports and the annual budget drafts of the abattoir, HCA/BoA.

To the public, artificial ice was presented as a modern novelty, a progressive feature in the nation's capital: 'In Helsinki, the masters even make their ice in a factory.'[69] In a country that was still very agrarian and highly connected to natural resources and seasonal cycles, artificial ice was something unusual, even odd. Unlike the situation in other European nations, where artificial ice was celebrated as the liberation from unpredictable natural conditions and thus nature's tyranny,[70] in southern Finland natural ice was abundant and nature was considered a reliable companion in providing coldness. Furthermore, harvesting and trade of natural ice was connected with old and well-tried traditions, local livelihoods and skilled individuals specialised in the handling of ice.[71] The necessity and superiority of artificial ice over natural ice had to be constructed in another way.

The modern flair of the ice factory was presented in a very positive light. One report praised its capacity to produce 'the best crystal ice',[72] as well as the beauty of the product and the impressiveness of the machinery. Most importantly, artificial ice from the abattoir was presented as pure, and hence preferable to natural ice. 'It's certainly pure – as pure as tap water – and also we here in Finland should shift to using clean, artificially manufactured ice', as one popular periodical

[68] HCA/BoA 1957/ Minutes Ca:25a, 29 Aug. 1957, 135§, Agenda no 5.

[69] 'Helsingin herrat tekevät jäänkin tehtaassa', *Suomen Kuvalehti* 9/1936.

[70] See Woods 2017, 96.

[71] HCA/HB/HBM/Ca:58/19 Feb. 1935, 32§, Appendix 1.

[72] 'Helsingin herrat tekevät jäänkin tehtaassa', *Suomen Kuvalehti,* 9/1936, 326–327.

put it.[73] The mentioned 'shift' related to the common use of natural ice, the quality of which was being now questioned in comparison to the hygienic superiority of artificial ice. Authorities and the media declared artificially manufactured ice a progressive step forward in terms of improving health and hygienic conditions.[74]

The abattoir, a city owned business, stated that its primary aim was less profit and more improving hygiene.[75] When entering the ice trade market in Helsinki, the abattoir devised a hygienically-focused advertising strategy. Advertisements highlighted the hygienic purity of artificial ice (Figures 4 and 5), and references were made to hygienic authorities. Communal authority lay with the city's health board, which served as the regulative authority overseeing the hygienic quality of all ice sold and distributed in the city. It aimed at enhanced scientific credibility by circulating a statement made by a professor of hygiene at the University of Helsinki, Professor Oscar von Hellens, who strongly advocated the benefits of artificial ice use over the unhygienic qualities of natural ice.[76]

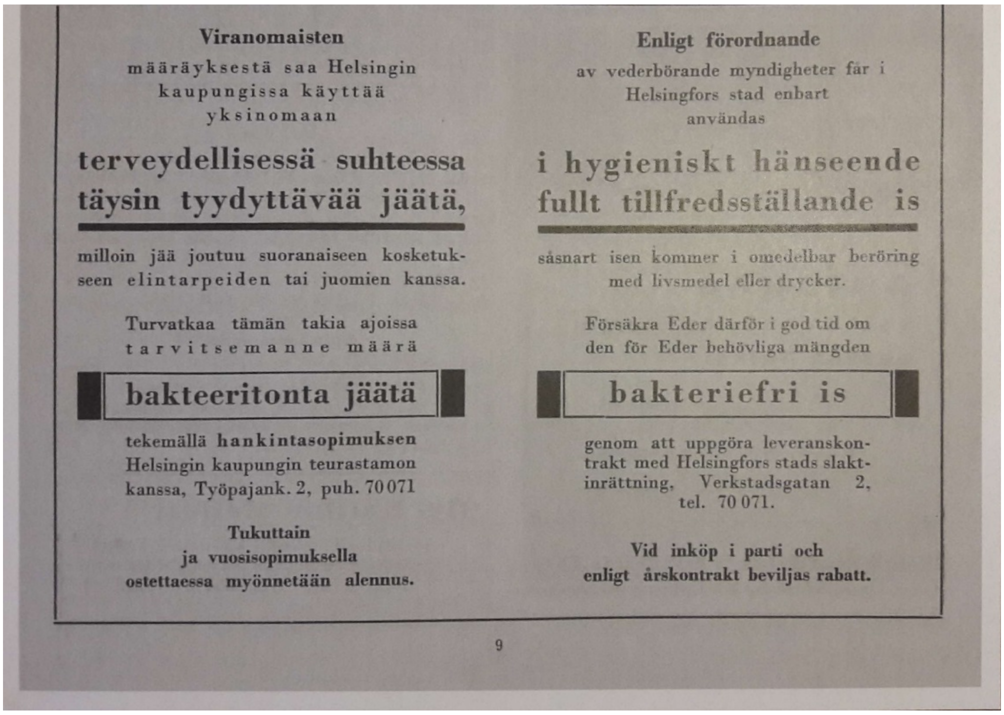

Figure 4. The communal abattoir's 1935 advertisement for 'bacteria-free ice', which complied with the city authorities' orders regarding the exclusive use of 'ice which is entirely satisfactory in regard to health' (Source: *Suomen Hotelli-, Ravintola ja kahvilalehti* 1935, 7 (4): 9).

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[73] 'Helsingin herrat tekevät jäänkin tehtaassa', *Suomen Kuvalehti,* 9/1936, 327.

[74] 'Keskellä kesää valmistetaan tonneittain jäätä', *Suomen Sosialidemokraatti,* 27 Jul. 1934, 1.

[75] HCA/ BA 1932–1933/C CI:1 /Minutes 20 Dec. 1932, 3§/Unnumbered Appendix.

[76] HCA/ BA 1934/ C Cl:2/Minutes 22 May 1934, 14§.

Figure 5. Abattoir ice factory advertisement from 1936. It states that its 'hygienically entirely satisfactory ice' is manufactured using 'pure tap water' (Source: *Ravintolahenkilökunta* 8/1936: 9).

Artificial ice was preferred as a preventative health measure. Since proper supervision of the quality of natural ice was defective, the availability of this new kind of ice inspired a new, hygienic era. 'From now on we all demand: *give us pure ice!*', proclaimed the popular periodical *Suomen Kuvalehti*.[77] The hygienic doubt that was cast over natural ice left a lasting uncertainty in the minds of consumers, and advocates of the ice factory encouraged this doubt by claiming that the use of natural ice was 'unpleasant'.[78] Paradoxically, the ice factory used the water supply provided by the city's water works to manufacture artificial ice. Helsinki's untreated water supply had, since the construction of the water works in 1876, originated from the Vantaa River. The city's water works had struggled from the very early years onwards with quantitative and especially qualitative problems related to the water's source and the purification process.[79] However, the purity of artificial ice made from this water was never really questioned. Doubts were cast only on the natural ice. Since the full operation of the ice factory meant that an alternative was now available, newspapers reported that a ban on natural ice was planned due to health concerns. As soon as artificial ice could be produced in sufficient quantity, an entire shift to artificial ice was anticipated.[80]

[77] 'Helsingin herrat tekevät jäänkin tehtaassa', *Suomen Kuvalehti* 9/1936, 327, original emphasis.

[78] Tallqvist 1935, 4. Freidberg (2009, 25) has identified a similar pattern during the competition between natural ice suppliers and ice manufacturers in the US. In order to underscore their product's superiority, the ice manufacturers encouraged the consumers' disgust at natural ice and stressed that their ice was produced with distilled water.

[79] See Herranen 2001; Schönach 2015.

[80] *Suomen Sosialidemokraatti,* 27 Jul. 1934, 1.

But was the competition about purity between natural and artificial ice justified? The natural ice dealers in the city accused the authorities of inconsistency towards the hygienic threat caused by natural ice and saw the allegedly arbitrary restriction of natural ice sales as a result of competition in the market for coldness, and not a real hygienic question.[81] In their opinion, the motivation for hampering the sales of natural ice was to boost the business of the city owned ice factory. However, the hygienic claims proved to be very powerful. In the name of preventative hygiene, no evidence of actual realisation of risks was needed, and the possibility of a risk sufficed.

No cases of natural ice having caused illness were ever reported in Helsinki. The results of the investigations of the purity of ice by the hygienic laboratory support the conclusion that neither natural ice nor artificial ice posed a great hygienic threat as such. Moreover, the evidence suggests that the way in which ice was handled throughout the delivery process and stored by end consumers was a potential source of contamination. One sample of ice from the abattoir ice factory was found, upon inspection, to contain considerable amounts of bacteria. However, the contamination of the sample was attributed to the careless handling of the ice by the restaurant in question and not to the manufacturing process itself.[82] Similarly, one worker in the natural ice trade reflected, ‘one cannot talk about hygiene when seeing the restaurant’s ice stocks’[83] (see also Figure 6). Thus, the dispute over the hygienic superiority of either natural or artificial ice was missing the actual target, and was misleading. While the authorities never actually proved that ice itself was impure, the way in which it was extracted and used as part of various urban functionalities made it susceptible to external contamination, and thus hygienically suspicious.

Figure 6. Ice blocks delivered to restaurant Kaisaniemi in 1918. (Photo: Ivan Timiriasew, Courtesy of Helsinki City Museum).

The dispute during the 1930s about the hygienic superiority of natural vs. artificial ice and the vested economic interests faded soon, with the exceptional circumstances induced by World War

[81] HCA/HB/HBM/Ca:58/19 Feb. 1935, 32§, Appendix 1.

[82] HCA/Hygienic laboratory/ Serial inspections DcI:24 Drinking water and ice/20:1, 3 Sep. 1935, Nr 35, results table; SCH I 1956/ 40:1, Annual report of the Hygienic Laboratory, 39.

[83] Nääppä 1997, 248.

Two and the following reconstruction period. Since the 1930s and especially after the war, mechanical refrigeration started gradually to assume responsibility for producing and maintaining coldness and its superiority was above all associated with less laborious modes of operation and with the more even and controllable generation of low temperatures – as well as with hygienic advantages.[84] Typically, the moisture generated by ice to help cool the product or space in question supported the growth of mould and bacteria, which in turn jeopardised the hygienic objectives attached to the cooling of the product in the first place. Food hygiene as a significant branch of the overall hygienic project thus demonstrated a multifaceted and complex relationship to questions of the benefits obtained from lower temperatures and the different means of creating coldness to facilitate proper hygiene.

AMBIGUOUS ICE AND THE HYGIENIC PROJECT

The hygienic debate in Finland regarding the use of ice must be considered marginal in comparison to other currents during the hygienic movement era. On the individual level, the use of ice in northern latitudes, in cities such as Helsinki, occurred rather late and only for short period of time. Questions of hygiene related to the uses of ice only directly concerned a rather small percentage of the (urban) population. Certainly from the standpoint of ice-related businesses, harvesters, suppliers and corporate end users, the hygienic question was important, but it posed a challenge only during a very limited time frame, as mechanical refrigeration was rapidly replacing ice-based refrigeration. The businesses were typically small, and while the income could be significant for an individual, no grand economic interests were involved in the ice business. On the communal and administrative level, and as the scarcity of sources on the use of ice indicates,[85] other more pressing issues and concerns dominated the hygienic agenda of the time. However, partly due to this marginality, it is a fruitful subject for study precisely because it allows for a micro-historical approach that can uncover in-depth insights.

The history of urban ice use and its hygienic implications reveals striking ambiguities with respect to the role of ice in the hygienic project and the hygienic qualities of ice itself. Ice as part of the hygienic project related most importantly to food hygiene and the role of ice as a coolant to enhance the preservation and good quality of food. The emphasis put on hygienic dairy products formed a cornerstone of the hygienic goals of the late nineteenth and first half of the twentieth century since such products greatly impacted on public health and contributed to infant mortality in particular. However, as with urban sanitation, the hygienic considerations related to ice were double-edged. The hygienic improvements of the sanitary revolution contributed to severe sewage-induced water pollution, and thus a hygienic problem, the necessity of ice for advances in food hygiene bumped up against questions about the hygienic qualities of the ice itself. Thus, a tension emerged at the time in the hygienic way of thinking about elements of the natural world, such as air, light, water, fire and

[84] 'Porvoon Panimo Oy varustautunut jäähdytyslaitoksella', *Mallasjuomat* 12/1936, 364–366.

[85] Environmental historical sources are often fragmented, scattered and potentially scarce (Massa 1991). The problem was evident in this case. Also e.g. Hengsbach (1970, 88) has noted that historical sources on the usage of ice in the Berlin area are scarce, probably because it was considered so self-evident and thus left unreported. Finding relevant sources typically advances in a heuristic process (see Winiwarter and Knoll, 2007), which proved to be the best solution also in this study.

soil. This case shows the tension applies to ice as well. As Turo-Kimmo Lehtonen notes, 'The purifying tool can be the bearer of danger'.[86] Ice was a provider of hygienic assets, while at the same time posing a hygienic threat.

The second ambiguity relates to the purity of ice in relation to polluted water. Contradictory understandings of the nature of the hygienic constitution of ice and the related risks persisted throughout the entire era of ice-based refrigeration in Finland. Beliefs about the allegedly natural condition of ice formation expelling any potential impurities from water coexisted with hygienic fears and doubts about the quality of ice itself, or the careless handling of ice, as cause of bacterial contagion. The two opposite stances long coexisted, and even though they were hardly discussed together, both views at times came into play to serve the interests of the contemporary context and marketing interests within the ice business. As Suzanne Freidberg[87] has found in the US, the aversion of consumers to ice harvested from waste-receiving water bodies originated mostly in feelings of disgust rather than from any actual hygienic risk. This links the history of ice usage and its hygienic relevance to the material substance of ice itself, to the images and mental constructs related to this urban resource and its purity.

Along with many other aspects of hygiene, the scientific disputes about the hygienic purity of ice represented an international and widespread debate that confirms the notions of influences diffusing around and across continents especially within the medical and sanitary engineering professions.[88] As the case of Helsinki shows, the investigation of one location can reveal how these international trends affected a particular locality within its particular environmental setting.

A focus on the history of ice hygiene broadens our understanding of the nature of the hygienic movement in its entirety and adds a new dimension to our understanding of the environmental historical past and the changing relations of urbanites to their local natural resources. The hygienic project was closely linked with the emerging politics of (cold) temperatures, which developed in conjunction with new scientific understandings about microbiological pathogens, their virulence in cold temperatures and the methods for investigating them. The means of controlling and regulating low temperatures in food provisioning became increasingly normalised. Yet due to the ambivalent nature of ice in service of this pursuit, it was subject to politicised interpretations and debates as well. Thus, the study highlights the intertwined nature of the environmental and socio-cultural dimensions of frozen water and the urban hygienic project in the nineteenth and early twentieth centuries. As urban environmental history scholarship has widely neglected ice-related phenomena thus far, many new insights can be gained by including specific cryospheric aspects of urban hygiene in future scholarship as well.[89]

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[87] Freidberg 2009, 25.

[88] See Hietala, 1987.

[89] Smedley and Wickman, 2017.

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Suomen Kuvalehti

Suomen Sosialidemokraatti

Tampereen Sanomat

Uusi Suometar

Professional journals (articles with no authors indicated, but mostly prepared by an editorial staff of professionals)

Mallasjuomat (The monthly journal on stakeholders of malt liquor industries)

Suomen Hotelli-, ravintola ja kahvilalehti (Journal for hotels, restaurants and cafés)

Suomen terveydenhoitolehti (Popular journal on medical issues, published by the medical association Duodecim)

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